We claim:

1. A method for forming integrated circuit copper lines, comprising:

forming a trench in a dielectric layer;

forming a first metal layer in said trench using physical vapor deposition and a high atomic number metal;

forming a second metal layer in said trench over said first metal layer using chemical vapor deposition and a high atomic number metal; and

filling said trench with copper by electroplating copper directly on said second metal layer.

2. The method of claim 1 wherein said high atomic number metal is selected from a group consisting of Ruthenium, Iridium, Rhodium, and Palladium.

3. The method of claim 1 wherein said forming a first metal layer in said trench comprises forming a Ruthenium layer using a plasma excitation power of 100 to 1000 watts with

a DC power of 5KW to 30 KW applied to a sputter metal target.

4. The method of claim 1 wherein said forming a second metal layer in said trench comprises flowing a vapor containing Ruthenium over a surface heated to between 100°C and 350°C.

5. The method of claim 1 further comprising forming a third metal layer in said trench over said first metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

6. The method of claim 5 further comprising forming a fourth metal layer in said trench over said third metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

7. A method for forming integrated circuit interconnect copper lines, comprising:

forming a trench in a dielectric layer;

forming a first metal layer in said trench using a plasma excitation power of 100 to 1000 watts with a DC power of 5KW to 30 KW applied to a sputter metal target comprising Ruthenium;

forming a second metal layer in said trench over said first metal layer wherein said forming a second metal layer comprises flowing a vapor containing Ruthenium over a surface heated to between 100°C and 350°C.; and

filling said trench with copper by electroplating copper directly on said second metal layer.

8. The method of claim 7 wherein said first metal layer is less than 50A thick.

9. The method of claim 7 further comprising forming a third metal layer in said trench over said first metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

10. The method of claim 9 further comprising forming a fourth metal layer in said trench over said third metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

11. An integrated circuit copper interconnect structure, comprising:

a trench formed in a dielectric layer;

a first metal layer formed in said trench using physical vapor deposition and a high atomic number metal;

a second metal layer formed in said trench over said first metal layer using chemical vapor deposition and a high atomic number metal; and

a copper structure formed directly on said second metal layer that fills said trench wherein said copper structure is formed by electroplating.

12. The method of claim 11 wherein said high atomic number metal is selected from a group consisting of Ruthenium, Iridium, Rhodium, and Palladium.

13. The method of claim 11 wherein said first metal layer comprises a Ruthenium layer formed using a plasma

excitation power of 100 to 1000 watts with a DC power of 5KW to 30 KW applied to a sputter metal target.

14. The method of claim 13 wherein said second metal layer comprises a Ruthenium layer formed by flowing a vapor containing Ruthenium over a surface heated to between 100°C and 350°C.

15. The method of claim 11 further comprising a third metal layer formed over said first metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

16. The method of claim 15 further comprising a fourth metal layer formed over said third metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

17. A method for forming circuit copper lines, comprising:

forming a trench in a dielectric layer;

forming a first metal layer in said trench using physical vapor deposition and a high atomic number metal;

exposing said first metal layer to a plasma treatment;

forming a second metal layer in said trench over said first metal layer using chemical vapor deposition and a high atomic number metal; and

filling said trench with copper by electroplating copper directly on said second metal layer.

18. The method of claim 17 wherein said forming a first metal layer in said trench comprises forming a Ruthenium layer using a plasma excitation power of 100 to 1000 watts with a DC power of 5KW to 30 KW applied to a sputter metal target.

19. The method of claim 18 wherein said forming a second metal layer in said trench comprises flowing a vapor containing Ruthenium over a surface heated to between 100°C and 350°C.

20. The method of claim 19 wherein said plasma treatment comprises exposing said first metal layer to a plasma with excitation power levels of less that 1000 Watts.

21. The method of claim 20 further comprising forming a third metal layer in said trench over said first metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.

22. The method of claim 21 further comprising forming a fourth metal layer in said trench over said third metal layer and beneath said second metal layer using chemical vapor deposition and a high atomic number metal.